CHBE 571
Flow and Transport in Porous Media I

Geology, Chemistry and Physics of Fluid Transport

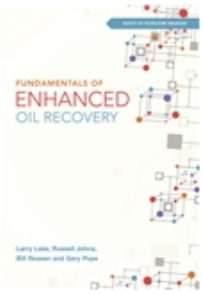
Syllabus

- **Chapter 1 Subsurface Macro Structure**
  - **Depositional environments**
    Alterations
- **Chapter 2 Subsurface Micro Structure**
  - **Rock and soil minerals**
    Diagenesis
    Morphology of the pore space
    Mineral surface chemistry
- **Chapter 3 Rock Properties**
  - **Grain size distribution**
    Pore shape
    Pore size distribution
    Surface area
    Porosity
    Effect of stress
    Permeability
- **Chapter 4 Volumetric Flux: Darcy's Law**
  - **D' Arcy's original experiments**
    Flow potential
    Permeability tensor
    Permeability micro-heterogeneity
    Permeability anisotropy
    Darcy's law from momentum balance
    Non darcy flow
- **Chapter 5 Multiphase Pore Fluid Distribution**
  - **Capillarity**
    Nonwetting phase trapping
    Hysteresis
    Capillary desaturation
    Normalized saturation for relative permeability and capillary pressure
    Relative permeability models
    Three phase relative permeability
    Measurement methods

- **Chapter 6 Conservation Equations for Multiphase-Multicomponent Flow Through Porous Media**
  - **Fluxes in isothermal flow**
    Mass balance
    Definitions and constitutive equations for isothermal flow
    Special cases
    Overall material balance
- **Chapter 7 Two Phase, One Dimensional Displacement**
  - **Dimensionless and normalized variables**
    Trajectories in distance-time space
    Definition of waves
    Mass balance across shock
    Average saturation and recovery efficiency
    Effect of gravity on displacement
    Relation between mobility ratio and gravity number on displacement
    Gravity drainage
    Interference of waves
- **Chapter 8 1-D, Multiphase-Multicomponent Displacement**
  - **Overall Concentration and Fractional Flow**
    Differential Equations
    Concepts
    Concentration Velocities in Multicomponent Systems
    Self-Similar Solutions
    Example with Two Dependent Variables
    Shock
    CO2 + Decane System
    Surfactant Flooding
- **Chapter 9 Ion Exchange with Clays**
  - **Equilibrium and Electroneutrality Relations**
    Relationship between Composition of Electrolyte Solution and of Clays
    Ion Exchange Waves
    Calculation of Route, Profile, and History
    Ion Exchange with Surfactant and Clays

Reference Book for Class

Bookstore



Fundamentals of Enhanced Oil Recovery

Larry W. Lake, Russell Johns, Bill Rossen & Gary Pope

2014
496;Softcover
ISBN:978-1-61399-328-6
Society of Petroleum Engineers

★★★★★ reviews

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Description

A revision of the 1989 classic, Enhanced Oil Recovery by Larry Lake, this text, Fundamentals of Enhanced Oil Recovery, retains the original work's emphasis on fractional flow theory and phase behavior to explain enhanced oil recovery (EOR) processes. There is additional coverage on cutting edge (or current) topics, such as low-salinity EOR, steam-assisted gravity drainage, and expanded coverage on thermodynamics and foam EOR. With its frequent reinforcement of two fundamental EOR principles, lowering the mobility ratio and increasing the capillary number, it is an excellent resource for undergraduate classes.